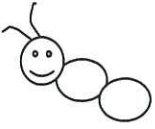
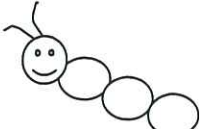
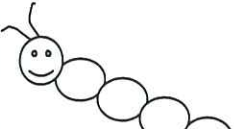




Growing Patterns

Growing Caterpillars

				
1 day old	2 days old	3 days old	4 days old	5 days old

PROBLEM:

Students in Ms. Dee's year one class are investigating the relationship between the age and number of circles of a growing caterpillar. Help her students to find out the pattern and rule to draw a caterpillar of any age.

1. Draw the next two caterpillars.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the 10 days old caterpillar will look like and tell how many circles you would need to draw. Explain any pattern you used to find this answer.

4

The 10 days caterpillar will have 12 circle.

I add 2 to the (number of days) age of the caterpillar

^{days} Years old	Number of circles
1	3
2	4
3	5
4	6
5	7
6	8

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the number of circles (C) in terms of the age (d) of the caterpillars

$$C = d + 2$$

Age in days (d)	Number of circles (C)
10	12
25	27
100	102

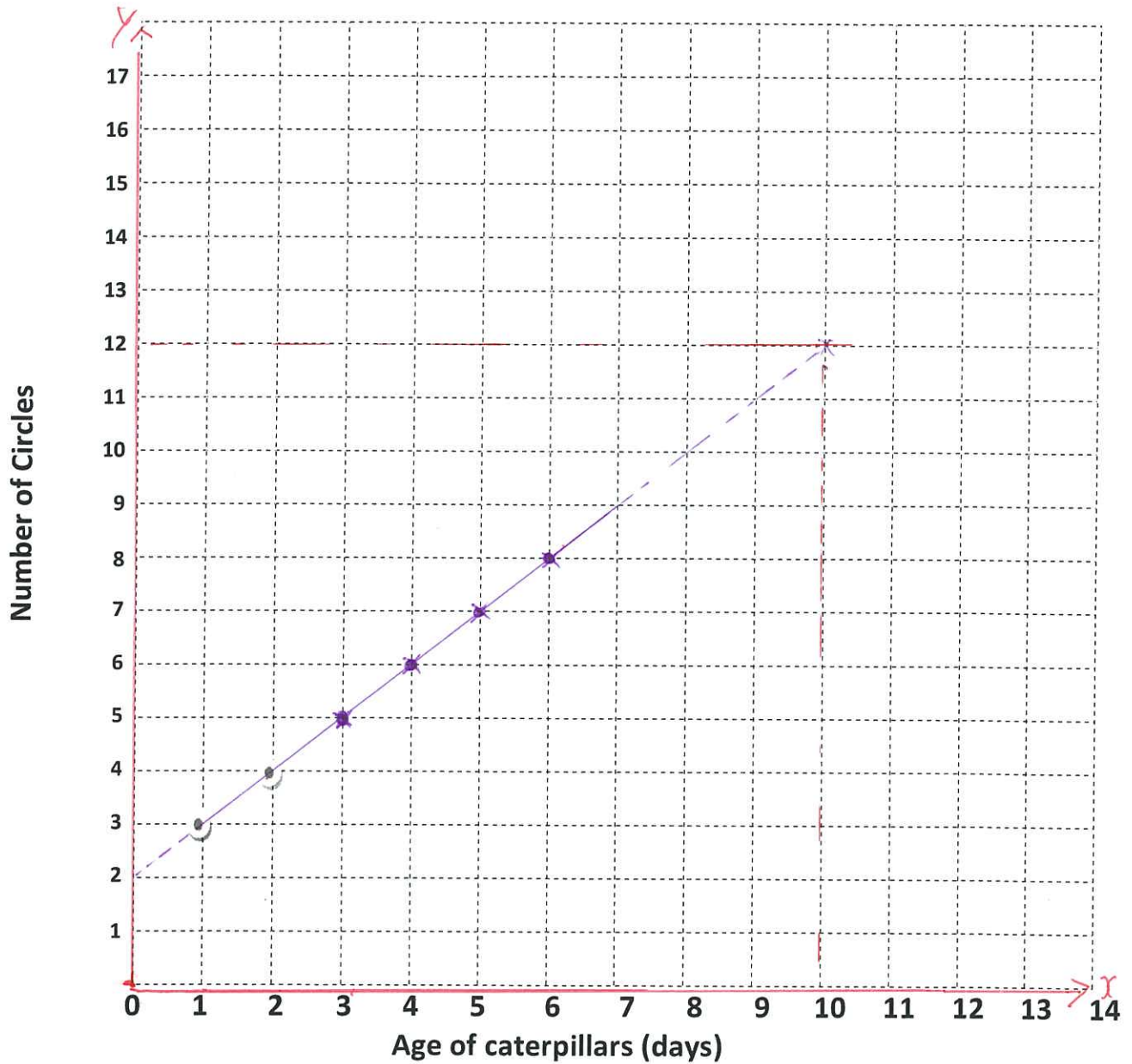
Growing Patterns

Growing Caterpillars

3

linear

Relationship between number of circles and caterpillar's age




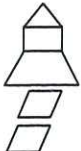
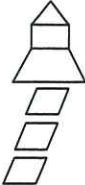


Name: Answer (level 2)

Class: _____

Date: _____

Growing Patterns

The Rocket Pattern

				
Stage 1	Stage 2	Stage 3	Stage 4	Stage 5

PROBLEM:

Students in Mr. Mok's year five class are using pattern blocks to build rocket patterns. Help his students find out the rocket pattern and rule to draw a rocket at any stage.

<ol style="list-style-type: none"> Draw the stage 4 and stage 5 rockets. Complete the table of values. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you). Predict what the stage 10 rocket will look like and tell how many pieces you would need to build it. Explain any pattern you used to find this answer. 			
	Stage	Rocket pieces + Puffs	Total number of blocks
	1	<u>3+1</u>	4
	2	<u>3+2</u>	5
	3	<u>3+3</u>	6
	4	<u>3+4</u>	7
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>4 The stage 10 rocket will have 10 puffs and the rocket of 3 block, we need 13 blocks to build it.</p> </div> <p>The rule is adding 3 to the stage number</p>	5	<u>3+5</u>	8
	6	<u>3+6</u>	9

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the total number of pieces (P) in terms of the stage of the rocket (s)

$$P = 3 + s$$

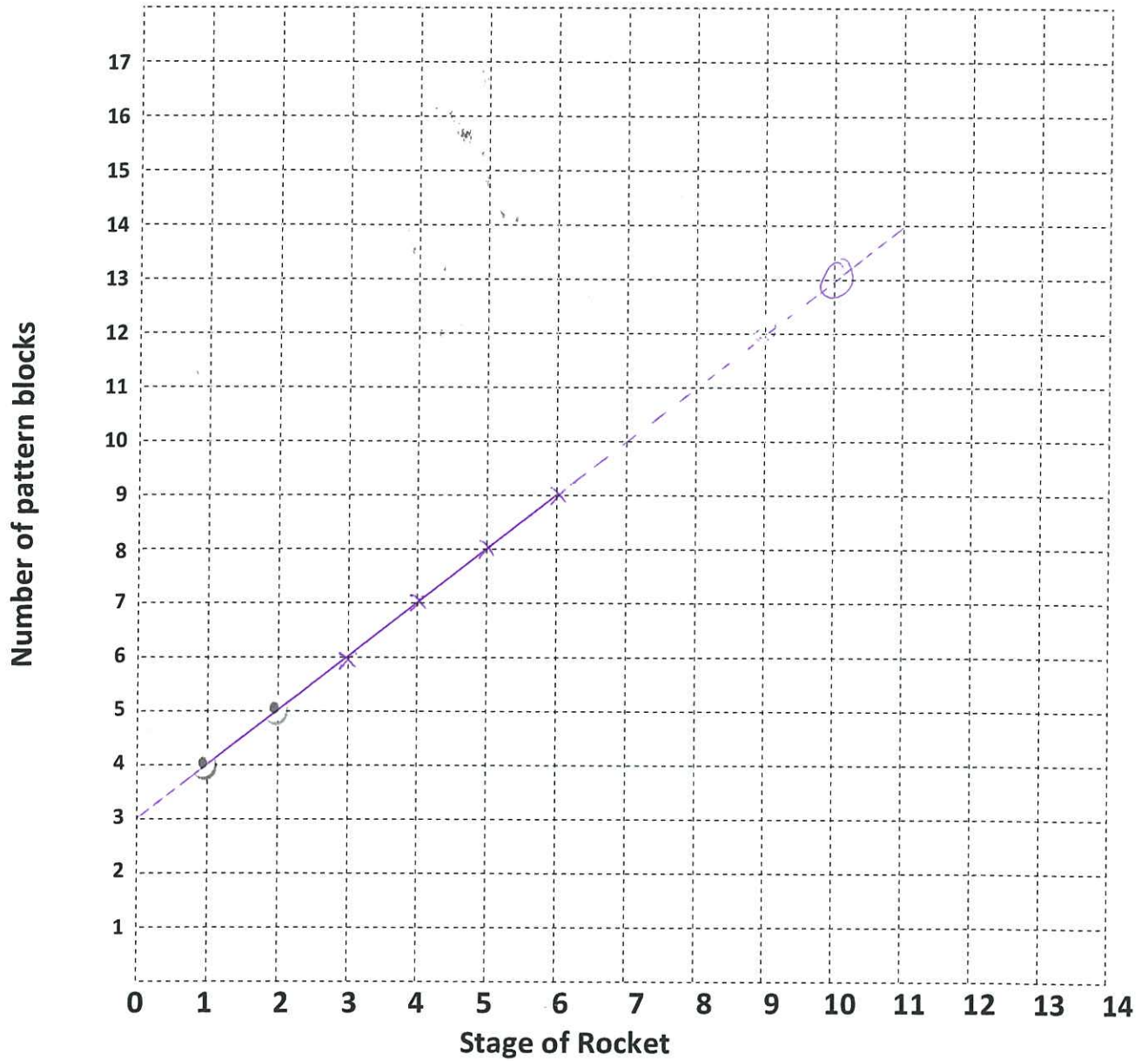
Stage (s)	Total number of pieces (P)
10	<u>13</u>
25	<u>28</u>
100	<u>103</u>

Growing Patterns

The Rocket Pattern

3

Number of pattern blocks used to build different stages rocket



(level 3)

Name: Answer ()

Class: _____

Date: _____

Growing Patterns

Tables & Chairs Investigation

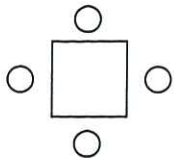


Figure 1

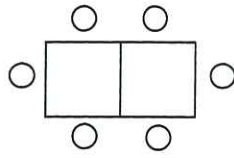
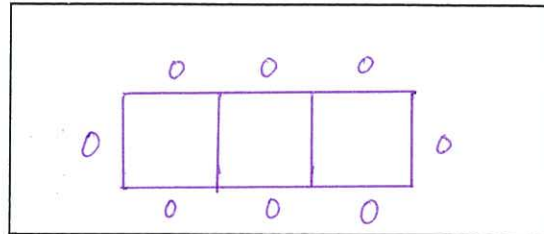


Figure 2



1

Figure 3

PROBLEM: Restaurants often use small square tables to seat customers. One chair is placed on each side of the table. Four chairs fit around one square table [figure 1]. Restaurants handle larger groups of customers by pushing together tables. Two tables pushed together [Figure 2] will seat six customers.

1. Draw a diagram showing how many customers would be seated at three square tables pushed together [Figure 3].
2. Complete the table for reference.
3. Plot the data as a line graph on the graph paper provided (the first two points have been plotted for you).
4. Find patterns you can use to predict the number of customers that may be seated at any size table and describe the pattern in words.

4

The pattern is adding 2 to the previous one.
or add 2 times the number of table to 2.

Number of Tables	Number of Customers
1	(2×1) $2 + 2 = 4$ $2(1+1)$
2	(2×2) $2 + 4 = 6$ $2(1+2)$
3	(2×3) $2 + 6 = 8$ $2(1+3)$
4	(2×4) $2 + 8 = 10$ $2(1+4)$
5	(2×5) $2 + 10 = 12$ $2(1+5)$
6	(2×6) $2 + 12 = 14$ $2(1+6)$

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the number of customers (C) in terms of the number of tables (t).

$$C = 2 + 2t \quad \text{or} \quad 2(1+t)$$

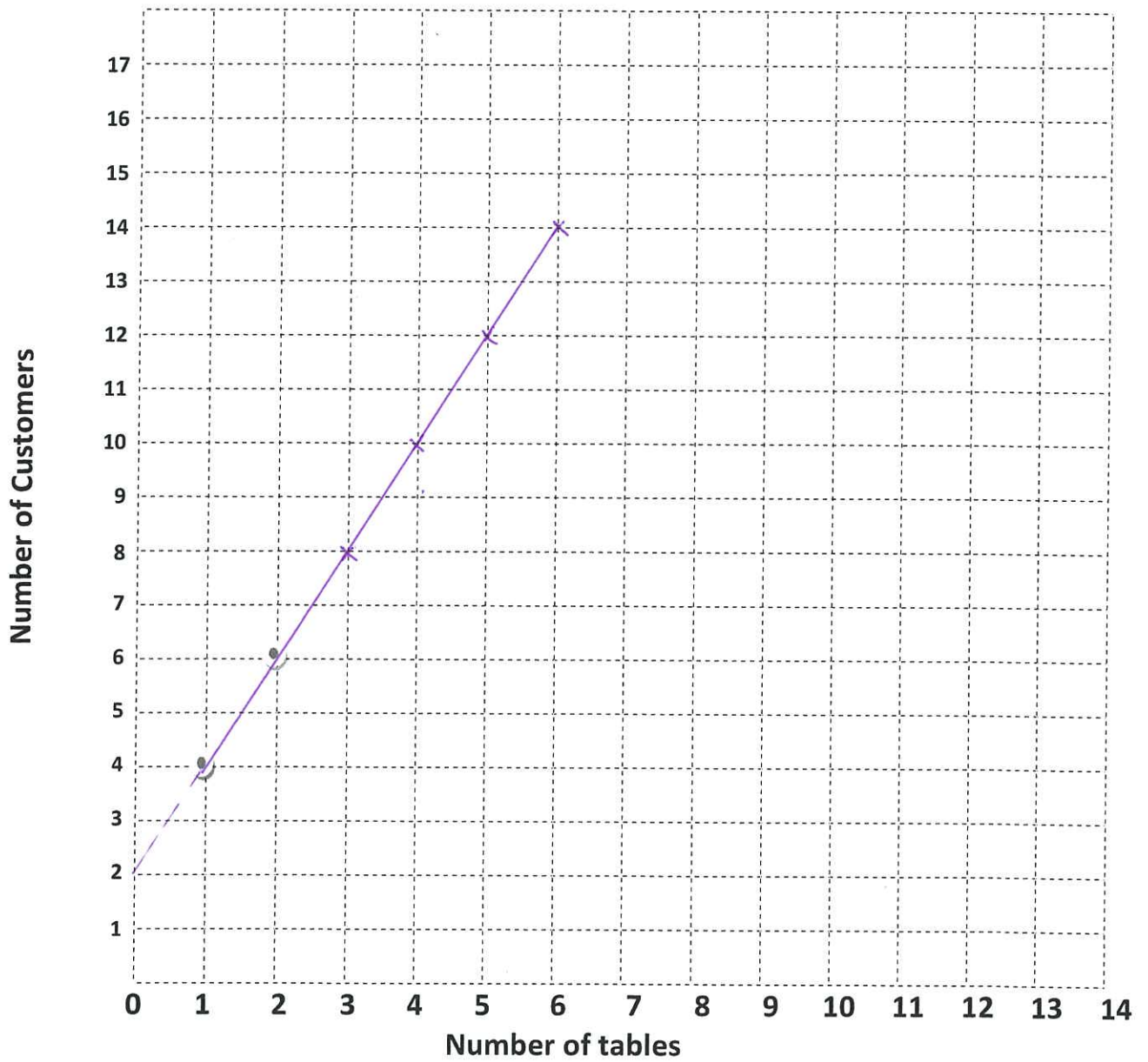
Number of Tables (t)	Number of Customers (C)
10	$2 + 20 = 22$ $2(1+10)$
25	$2 + 2 \times 25 = 52$ $2(1+25)$
100	$2 + 2 \times 100 = 102$ $2(1+100)$

Growing Patterns

Tables & Chairs Investigation

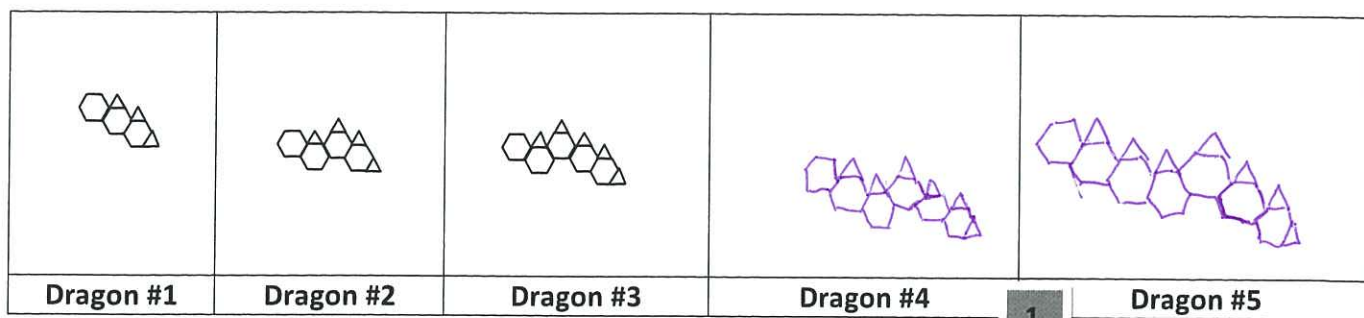
3

Relationship between number of tables and customers



Growing Patterns

Hexagon Dragons



PROBLEM:

Students in Mr. Bridge's class are making up their own growing patterns. Maria uses pattern blocks to make a growing dragon. Help her to finish the tasks that Mr. Bridge has set for her.

1. Use pattern blocks to build and draw the next two dragons in this pattern.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the tenth dragon will look like and tell how many blocks you would need to build it. Explain any pattern you used to find this answer.

Dragon #	Number of blocks added	TOTAL number of blocks
1	6	3+3=6
2	2	4+4=8
3	2	6+5=11
4	2	6+6=12
5	2	7+7=14
6	2	8+8=16
7	2	9+9=18
8	2	10+10=20
9	2	11+11=22
10	2	12+12=24

4

The 10 dragon will have a hexagonal Head and 11 body with a triangle and hexagon and a tail of triangle. I need 24 blocks to build it. I add the dragon number to 2 and double that number.

CHALLENGE:

- Maria would like to figure out how many blocks he would need to build the 25th and 100th dragons without actually building it. Write the rule in words or an algebraic expression that Maria can use to figure out the total number of blocks for any dragon without having to build it? Explain how your rule works.

add 2 to the number of dragon (n) then double that number.

$$T = (2 + n) \times 2 \Rightarrow 2(2 + n)$$

or $T = 4 + 2n$

Dragon # (n)	Number of blocks added (A)	TOTAL number of blocks (T)
25	2	27+27=54
100	2	102+102=204

Growing Patterns

Hexagon Dragons

3

Growing Hexagon Dragons

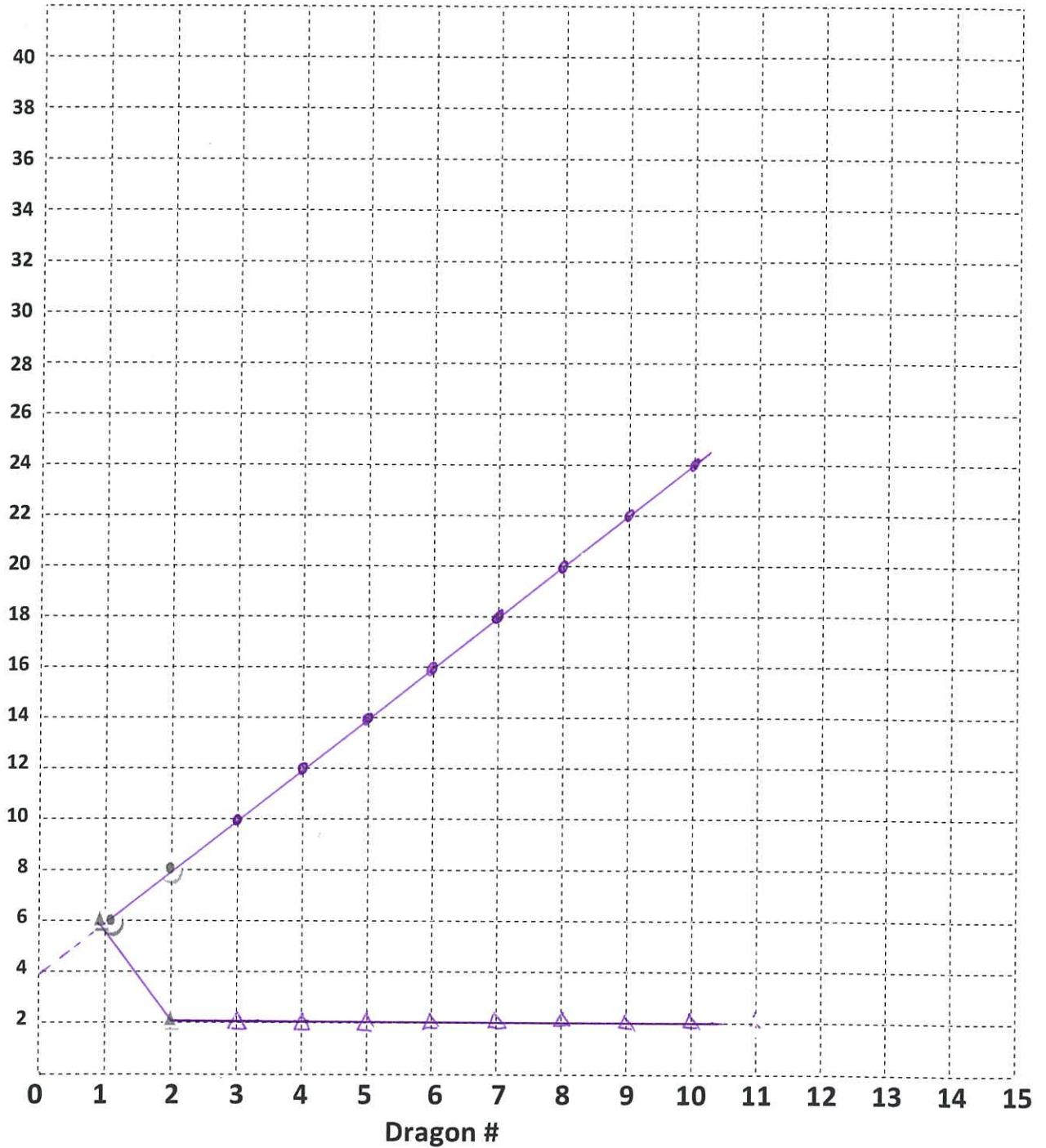
Number of blocks added





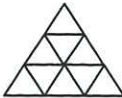
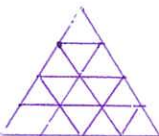
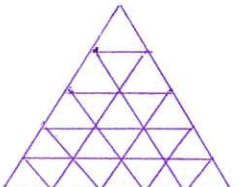
Total number of blocks



Number of blocks



Growing Patterns**Growing Fir Tree**

				
Tree 1	Tree 2	Tree 3	Tree 4	Tree 5

PROBLEM:

Students in Mrs. Como's class are making up their own growing patterns. Angela uses triangle pattern blocks to make a growing fir tree. Help her to finish the tasks that Mrs. Como has set for her.

- Use pattern blocks to build and draw the next two fir trees in this pattern [Tree 4 and Tree 5].
- Complete the table of values.
- Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
- Predict what the tenth fir tree will look like and tell how many blocks you would need to build it. Explain any pattern you used to find this answer.

4 The 10th fir tree will have 10 layers with 1 on top and 19 at the bottom. I need 100 blocks to make it.
The total number of blocks is the square of the tree #.

Tree #	Number of blocks added	TOTAL number of blocks
1	$2 \times 1 - 1 = 1$	$1^2 = 1$
2	$2 \times 2 - 1 = 3$	$2^2 = 4$
3	$2 \times 3 - 1 = 5$	$3^2 = 9$
4	$2 \times 4 - 1 = 7$	$4^2 = 16$
5	$2 \times 5 - 1 = 9$	$5^2 = 25$
6	$2 \times 6 - 1 = 11$	$6^2 = 36$
7	$2 \times 7 - 1 = 13$	$7^2 = 49$
8	$2 \times 8 - 1 = 15$	$8^2 = 64$
9	$2 \times 9 - 1 = 17$	$9^2 = 81$
10	$2 \times 10 - 1 = 19$	$10^2 = 100$

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rules as algebraic expressions for number of blocks added (A) and the total number of blocks (T) in terms of the number of tree (n).

$$A = 2n - 1$$

$$T = n^2$$

Tree # (n)	Number of blocks added (A)	TOTAL number of blocks (T)
15	$2 \times 15 - 1 = 29$	$15^2 = 225$
25	$2 \times 25 - 1 = 49$	$25^2 = 625$
100	$2 \times 100 - 1 = 199$	$100^2 = 10000$

Growing Patterns

Growing Fir Trees

3

Growing Fir Trees

Number of blocks added ▲

Total number of blocks ●

